

APPENDIX M

SOCIO-ECONOMIC IMPACTS, ENVIRONMENTAL JUSTICE, AND CHILDREN'S ENVIRONMENTAL HEALTH AND SAFETY RISKS

This appendix contains background material that supplements the material contained in Section 5.14, Environmental Justice of Chapter 5. This appendix consists of the following sections:

- **Attachment M-1:** Terminal Area Plan – Environmental Justice (EJ) Analysis

ATTACHMENT M-1

TERMINAL AREA PLAN – ENVIRONMENTAL JUSTICE (EJ) ANALYSIS



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MEMORANDUM

To: Amy B. Hanson, Environmental Protection Specialist
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From: Kurt M. Hellauer - Director, Federal Programs
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Date: December 6, 2021

Subject: Terminal Area Plan—Environmental Justice (EJ) Analysis

Reference: HMMH Project Number 307171.002.015

This memorandum outlines the analytical approach, data sources, assumptions, and results of the detailed Environmental Justice (EJ) analysis for the Terminal Area Plan (TAP). The purpose of the EJ analysis is to ascertain whether adverse impacts are borne disproportionately by minority, low-income populations, or both (EJ Populations). Communities or areas where EJ Populations reside are referred to in this memorandum as "Areas of Environmental Justice Concern."

1.0 Background

As defined in FAA 1050.1F Desk Reference, section 12.2, Environmental Justice is the "fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies." This memo addresses the element of fair treatment, which means identifying whether groups of people bear a disproportionate share of the negative environmental consequences resulting from industrial, governmental, and commercial operations or policies.

Executive Order (EO) 12898¹ **Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations** and US Department of Transportation (DoT) Order 5610.2(c)² **Department of Transportation Actions to Address Environmental Justice in Minority Populations and Low-Income Populations** discuss the need to identify if an action has the potential to have disproportionately high and adverse effects on minority or low-income populations. Title VI of the Civil Rights Act requires the FAA to ensure that no person, on account of his or her race, color, or national origin, is excluded from participation in, denied the benefits of, or subjected to discrimination under any program or activity receiving Federal financial assistance. The FAA implements the EO and DoT Order through guidance contained in the agency's National Environmental Policy Act (NEPA) implementing regulation³ and its companion Desk Reference⁴.

DoT Order 5610.2(c) at Appendix A, as restated in FAA's NEPA Desk Reference at Section 12.2.2, provides definitions for minority and low-income populations. A minority is defined as a person who is:

1. Black: a person having origins in any of the black racial groups of Africa;
2. Hispanic or Latino: a person of Mexican, Puerto Rican, Cuban, Central or South American, or other Spanish culture or origin, regardless of race;
3. Asian American: a person having origins in any of the original peoples of the Far East, Southeast Asia, the Indian subcontinent;

¹ Executive Order 12898 **Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations** issued February 16, 1994 (59 Federal Register 32)

² DoT Order 5610.2(c) **Department of Transportation Actions to Address Environmental Justice in Minority Populations and Low-Income Populations** issued May 14, 2021

³ FAA Order 1050.1F **Environmental Impacts: Policies and Procedures** issued July 15, 2015

⁴ FAA Order 1050.1F **Environmental Impacts: Policies and Procedures Desk Reference**, February 2020


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4. American Indian and Alaskan Native: a person having origins in any of the original people of North America, South America (including Central America) and who maintains cultural identification through tribal affiliation or community recognition; or
5. Native Hawaiian and Other Pacific Islander: people having origins in any of the original peoples of Hawaii, Guam, Samoa, or other Pacific Islands."

In the same documents, a low-income person is defined as "A person whose median household income is at or below the Department of Health and Human Services poverty guidelines."

Based on the results of noise modeling, the presence of potentially significant noise impacts as defined in FAA's NEPA guidance is anticipated. Therefore, a detailed analysis of how those potentially significant impacts are distributed geographically and a detailed demographic and statistical analysis of the populations residing in these areas is warranted. Based on our prior work and experience with the 2019 Interim Fly Quiet Re-Evaluation (IFQ), the environmental study areas are relatively similar.

At this juncture, the potential presence or absence of significant impacts with respect to other FAA environmental impact categories has not yet been fully ascertained. The environmental impact categories and their current likelihood of warranting detailed environmental analysis are listed in **Table 1**.

Table 1. Environmental Impact Categories Anticipated to Warrant Detailed Analysis in the EA

Category	Anticipated Detailed Analysis
Air Quality	Yes
Biological Resources	Yes
Climate	Yes
Coastal Resources	No
Department of Transportation Act, Section 4(f)	Yes
Farmlands	No
Hazardous Materials, Solid Waste and Pollution Prevention	Yes
Historical, Architectural and Cultural Resources	Yes
Land Use	No
Natural Resources and Energy Supply	Yes
Noise and Noise-Compatible Land Use	Yes
Socioeconomic, Environmental Justice, Children's Environmental Health and Safety Risks	Yes
Visual Effects	Yes
Water Resources	Yes

Source: Memorandum from HMMH to FAA Chicago ADO dated November 5, 2021, Re: *Environmental Impact Categories Recommended for Dismissal from Detailed Analysis for Terminal Area Plan and Air Traffic Procedures Environmental Assessment (TAP EA)*





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EJ analysis was conducted with respect to the effects on the environmental impact categories listed as **Yes** to the extent that the proposed action is anticipated to have significant impacts (adverse or beneficial). This is consistent with CEQ guidance⁵ which indicates that among the factors to consider when assessing “disproportionately high and adverse environmental effects” from EO 12898 is whether the effects are “significant” as defined in NEPA. Other considerations from EO 12898, CEQ guidance, DoT and FAA orders on NEPA and EJ informing extent of analysis would include unique conditions such as: presence of populations with human health vulnerabilities (heightened disease susceptibility); socioeconomic vulnerabilities (disruptions to community mobility and access); and, cultural vulnerabilities such as subsistence consumption of fish and wildlife. These conditions do not appear to be present in the immediate vicinity of O'Hare.

It should be noted that preliminary analysis indicates that implementation of the Build Out Proposed Action or Interim Proposed Action would alter aircraft noise exposure around O'Hare in a manner that may be deemed significant. Conversely, analysis with respect to other environmental impact categories indicates that implementation of the Build Out Proposed Action or Interim Proposed Action would not alter the natural and man-made environment in a manner that may be deemed significant. Therefore, this EJ memorandum addresses the approach to evaluating environmental justice effects as it relates to the “Noise and Noise-Compatible Land Use” environmental impact category only.

2.0 Methodology, Data Sources, and Assumptions

Consistent with EO 12898, guidance from the Council on Environmental Quality^{6,7}, DoT Order 5610.2(c), the FAA Order 1050.1F Environmental Impacts: Policies and Procedures, and the companion 1050.1F Desk Reference, an EJ analysis answers two basic questions:

- **Predominantly Borne test:** Would implementation of the proposed action have adverse effects that are predominantly borne by an EJ Population?
- **Meaningfully Greater test:** Would implementation of the proposed action have adverse effects on an EJ Population that are appreciably more severe or greater in magnitude than the adverse effects that would be experienced by non-EJ populations?

An EJ analysis involves a distributional analysis of impacts experienced by the populations specifically identified in the environmental justice Executive Order and implementing regulations mentioned previously. The framework and approach for each EJ analysis is developed and based on the specific facts and circumstances associated with the Proposed Action and its anticipated effects that are the subject of detailed analysis under NEPA.

A specific approach was developed for the Terminal Area Plan (TAP) Environmental Assessment (EA). Throughout this memorandum, references are made to steps that refer to the text below concerning methods, data sources, and geographical extent of analysis. The following text details the steps to be followed. The approach relies upon analysis of demographic data for the areas potentially affected to determine reference populations, described in the following steps a) through e), with several sub-steps.

- a) **Data Source.** Demographic data normally used for these analyses, which are readily available from the US Census Bureau (USCB), either from the most recent decennial Census (the most recent being the “2020 Census”) or from the most recent, rolling, five-year American Community Survey 2015-2019 (2019 ACS).

The 2020 Census data have a finer degree of granularity (down to the census block) but do not include income/poverty characteristics. Beginning in 2005, a recurring five-year rolling ACS sampling program was implemented replacing the “long form” questionnaire of the decennial Census. The ACS is a sampling, as opposed to an enumeration of all persons that the decennial census is, and the ACS surveys economic characteristics in addition to population counts. Prior to 2010, previous decennial census enumerations employed a “long form” questionnaire which included income and poverty level data from approximately 15 percent of respondents. Another difference between an ACS and a decennial census is the granularity

⁵ CEQ Environmental Justice: Guidance under the National Environmental Policy Act issued December 10, 1997

⁶ CEQ Environmental Justice: Guidance under the National Environmental Policy Act issued December 10, 1997

⁷ Federal Interagency Working Group on Environmental Justice & NEPA Committee “Promising Practices for EJ Methodologies in NEPA Reviews”, March 2016



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of the data; decennial census data employ the smallest unit of measure, the *census block*. In contrast an ACS samples at the next higher level in the census geographical hierarchy, the *census block group*.

Figure 1 illustrates how the census tracts, census block groups, and census blocks relate. The smallest unit of measure is the Census Block; multiple Census Blocks are aggregated into Census Block Groups, and ultimately Census Blocks are aggregated to form Census Tracts.

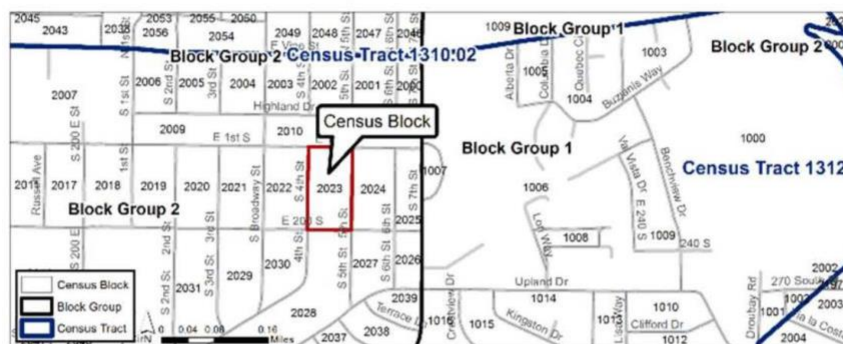


Figure 1. Examples of Census Geographical Units
Source: US Census Bureau. Geography Reference downloaded 9/7/2018

The FAA's noise modeling software, the Airport Environmental Design Tool (AEDT) includes the capability of doing limited analyses noise effects on EJ populations. To do so, it uses the ACS, downloaded separately, for its screening analysis of both race and ethnicity as well as screening analysis of income and poverty status. This AEDT EJ screening tool identifies areas of potential concern, primarily for purposes of outreach. For a detailed analysis to ascertain whether an action would have a disparate impact or disproportionately affect EJ populations, use of additional datasets and use of geospatial analytical tools outside of the AEDT are warranted.

For the part of the EJ analysis addressing effects of the TAP on race or ethnicity, HMMH used the 2020 Decennial Census dataset because, 1) it offers a greater degree of granularity, and 2) at the time of this writing, it is the most recent dataset available for these characteristics.

With respect to income and poverty status, HMMH used the most recent (2015-2019) ACS dataset even though the granularity is not as fine. The 2020 Census does not include income/poverty information since that is now gathered on an ongoing, rolling basis, albeit only down to the Census Block Group level. Given that circumstance, use of the most recently available ACS data was deemed appropriate by the FAA.

Additionally, DoT Order 5610.2(c) requires the use of Department of Health and Human Services (HHS) “poverty guidelines”³ as opposed to US Census Bureau “poverty thresholds.” (Both vary with family size increasing linearly.) There are minor differences in the income levels that HHS uses as a poverty guideline and that US Census Bureau uses as a threshold for the same sized household. Since AEDT directly relies upon Census data without attempting to reconcile them to HHS poverty guidelines, the analysis contemplated under DoT Order 5610.2(c) and FAA Order 1050.1F does not occur within AEDT. This is consistent with AEDT’s function and role as an initial screening tool for EJ rather than a tool for a more robust demographic analysis of affected populations.

⁸ The HHS issued Poverty Guidelines are established annually each January and published in the Federal Register (FR). For 2020 they were published on January 17, 2020 (85 FR 3060). For 2021 they were published on February 1, 2021 (86 FR 7732)

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The poverty guidelines themselves are taken from the US Department of Health and Human Services (HHS) 2020 Poverty Guidelines for the 48 Contiguous States and the District of Columbia which are reproduced in Table 2. The HHS guidelines are based on price changes through the previous year; therefore the 2020 poverty guidelines were chosen in order to most closely align with the timeframe of the most recently available ACS data set (2019)⁹. Use of these guidelines is consistent with the EJ analysis requirements of DoT Order 5610.2(c).

Since the HHS guidelines vary with household size and are reported in whole person intervals – whereas the average household size reported in a particular Census Block or Block Group is not – an interpolation of income values between two intervals was required for subsequent calculations. Additionally, as described further below in step (e), the values were adjusted upward by 150% to reflect a higher cost of living in the Chicago region.

Table 2. US Department of Health and Human Services 2020 Poverty Guidelines for the 48 Contiguous States and the District of Columbia and Proposed Terminal Area Plan Study Area Poverty Criteria

# in Family	Poverty Guideline	Increase / Person	Proposed CDA Guideline (150% of HHS)	Increase / Person
1	\$12,760		\$19,140	
2	\$17,240	\$4,480	\$25,860	\$6,720
3	\$21,720	\$4,480	\$32,580	\$6,720
4	\$26,200	\$4,480	\$39,300	\$6,720
5	\$30,680	\$4,480	\$46,020	\$6,720
6	\$35,160	\$4,480	\$52,740	\$6,720
7	\$39,640	\$4,480	\$59,460	\$6,720
8	\$44,120	\$4,480	\$66,180	\$6,720

Source: 2020 HHS Poverty Guidelines (85 FR 3060) published on January 17, 2020

Note: Proposed CDA guideline is 1.5 times the HHS Poverty Guideline for the same household.

- b) **Geographical Extent of Population Analysis.** Consistent with the methodology outlined in *Promising Practices for EJ Methodologies in NEPA Reviews*, EJ analysis involves identifying two distinct population sets, each for different purposes: a Reference Community and a Community of Comparison.
- i. A "Reference Community" serves as an aid for determining whether "Areas of EJ Concern" are present and where they are situated. The Reference Community serves as an initial benchmark for identifying areas of EJ Concern within the Project or Study Area. An Area of EJ Concern is one where the racial/ethnic demographics or poverty status of the population equal or exceed that of the Reference Community. The basic question is whether the EJ population potentially affected by a project would equal or be greater than that of a suitable reference community.
- Identifying an appropriate Reference Community to use as a benchmark enables subsequent identification of particular EJ Communities (Areas of EJ Concern) which may warrant additional analysis and outreach within a Project Area or Study Area. For example, is the EJ population (minority or income) less than, equal to, or greater than that of the nation, state, county, and or city? While the nation, state, county, and city populations could be chosen as a Reference Community, identification and selection of a more tailored, custom Reference Community relevant to the Proposed Action and Affected Environment that is the subject of the particular NEPA analysis is usually more appropriate.
- One test is whether the EJ population is greater than 50 percent of the overall population within a particular geographical unit (i.e., Census Block for race/ethnicity or Census Block Group for income/poverty). This test, referred to as the Predominantly Borne Test, does not require

⁹ *Poverty Guidelines* aspe.hhs.gov, October 12, 2021



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identification of a Reference Community. However, even when an EJ population residing within a geographical unit is less than 50 percent, further analysis is typically warranted under the relevant regulations and guidance to determine whether a disproportionate impact would occur to an EJ population. For that reason, an analysis and comparison of EJ population distribution to a larger Reference Community is conducted. EJ populations may tend to be clustered in a non-uniform manner around a project area, or in this case, around the airport (and within its associated study area). Therefore, comparison of EJ population distribution within a defined Study Area (or the area within which environmental effects would occur) to EJ population distribution within a broader, more regional Reference Community is appropriate. Consequently, for those Census Blocks and Block Groups where the EJ population represented less than 50 percent of the individual Census Block or Block Group, selection of an appropriate reference community is necessary to determine absence/presence of an EJ population.

For this analysis, the combined Cook County / DuPage County population serves as the Reference Community for identifying EJ populations. Within the TAP Study Area for Noise¹⁰, if a Census Block or Block Group had a higher percentage of EJ population than the Reference Community (combined Cook/DuPage Counties), then the Census Block or Block Group is identified as an "Area of Environmental Justice Concern" warranting more detailed analysis of the geographic distribution of environmental impacts with respect to those populations.

- ii. A "Community of Comparison" is also identified in order to conduct the disproportionate impact analysis (the two-pronged test of Predominantly Borne or Meaningfully Greater previously described). Once populations residing within Census Blocks or Block Groups that would be "Areas of Environmental Justice Concern" – those whose EJ populations are either greater than 50 percent or are greater than those in all blocks experiencing a significant impact – are identified, they will be further examined to determine whether a significant impact from the Build Out Proposed Action would occur. For example, with respect to noise impacts, the comparison of significant effects is determined by comparing the Proposed Build Out Proposed Action alternative to the noise exposure that would be occurring under Build Out No Action alternative.
- iii. Results from the Noise analyses associated with each alternative indicate that further, detailed demographic analysis is warranted in the area of the southwest quadrant of the airport. This area would be both within the DNL 65+ dBA contour and would experience a change of exposure of 1.5 dBA or greater due to the Proposed Build Out Proposed Action. A comparison of the racial/ethnicity composition of a specific Census Blocks and the percent of households below the poverty guidelines in a Census Block Group to the Community of Comparison was made to assess disproportionate impacts. Census Blocks and Block Groups whose EJ characteristics exceed that of the Community of Comparison by more than 10% would be deemed to bear a meaningfully greater share of the impacts. This is a generally accepted practice in DoT NEPA analyses, particularly for actions involving highway construction and property takings.
- c) To assist the FAA in determining impact significance (i.e., context and intensity) with respect to EJ analysis, tabular data allowing for ready examination of "reference community" and "community of comparison" populations has been prepared. Data is presented in a descending hierarchy of geographical units allowing for the assessment in a variety of contexts. These include:
 - i. United States – provided for context
 - ii. Illinois – provided for context
 - iii. Cook County – provided for context
 - iv. DuPage County -- provided for context

¹⁰ Environmental impact category can have differing study areas. The TAP EA has two study areas for noise while other impact categories have a single study area. See the HMMH TAP EA Noise Study Area Identification Methodology memorandum for more details.



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- v. Combined Cook County/DuPage County -- this is the geographical extent of the proposed Reference Community
- vi. Census Blocks and Block Groups intersecting with the TAP Study Area -- populations within these geographic units are compared to populations in the Reference Community to identify Areas of EJ Concern. These areas warrant a more detailed EJ analysis of the geographic distribution environmental effects from the proposed Build Out Proposed Action.

The following tabular data were developed since significant impacts area were identified an environmental impact category: Noise. EJ analysis with respect to noise impacts occurred as further described below.

- vii. Census Blocks and Block Groups intersecting with areas that would experience a significant impact have been identified (i.e., aircraft noise exposure from the Proposed Build Out Proposed Action greater than or equal to DNL 65 dBA and also experiencing a 1.5 dB change compared to the Proposed Build Out No Action). This geographical distribution analysis of impacts facilitates the identification of minority populations in order to establish an appropriate Community of Comparison. The aggregated demographic characteristics of those populations experiencing a significant impact form the Community of Comparison.

Then individual Blocks and Block Groups were compared to the aggregated demographic characteristics of the Community of Comparison to determine whether the impacts experienced by minority populations residing within individual Census Blocks or Block Groups would be meaningfully greater than the noise impacts occurring within the Community of Comparison as a whole. Identification of the Community of Comparison enables the disproportionate impact analysis (the "Meaningfully Greater" and "Predominantly Borne" tests).

- d) For the "disproportionate impact" test, which relied upon the Community of Comparison described in step (c.vii) above, the analysis:
 - i. First identified (at the parcel level) those instances where a non-compatible, residential land-use would both lie within the Build Out Proposed Action DNL 65+ dBA contour and would also experience a change of exposure of 1.5 dBA or greater (significant impact) compared to the Build Out No Action. (Note: although data available from Chicago Department of Aviation [CDA] that are used for this EJ analysis identify whether a house has been sound insulated or not, for purposes of EJ analysis, a residential dwelling unit, even if insulated, would still be deemed to be non-compatible.)

 To estimate and quantify the size of the EJ population, average household size from the Census Block or Block Group within which the change of exposure grid point sits is used to estimate minority or low-income populations affected¹¹. The assumption is that the demographic characteristics at the block or block group level are sufficiently uniform across either census geographical unit to apply to the individual parcels. Examination of the 2020 Census Data for the Community of Comparison indicates an average household size of 2.2 persons. For example, if a block group is 25% minority or low income and 20 parcels containing dwellings would experience a 1.5 dBA increase in exposure, the approach used estimated that 5 minority/low-income households and approximately 11 minority/low-income persons (~2.2 persons/household) would be affected.
 - ii. This assessment of demographic characteristics associated with persons experiencing a significant impact were then compared to the demographic characteristics of all persons experiencing an impact as a result of the Proposed Action. This entails a comparison of the particular effects identified in the Build Out Proposed Action, for the relevant project years, with the aggregate demographic characteristics of the entire area where significant impacts would occur in order to determine whether EJ populations would bear a disproportionate effect,

¹¹ Census data provides both the overall population count as well as the number of households within a particular census geography (i.e., block, block group, tract, etc.). The average household size is calculated by dividing the overall population by the number of households within the same census geography.



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applying the “meaningfully greater” test¹². For this purpose, impacts to EJ populations would be “meaningfully greater” than those experienced by the “community of comparison” if the percentage of EJ population in an affected geography substantially exceeded the EJ population’s percentage of the overall community of comparison. For purpose of this analysis, the EJ population in an affected census geography would substantially exceed the EJ population of the community of comparison if the former exceeded the latter by 10 percent or more. The specific comparison would be numbers of and percentages of EJ persons experiencing a significant impact within particular block groups versus the numbers/percentages of all persons experiencing significant impact within the entire Build Out No Action impact area, again for the relevant project years. For noise effects that is defined as all persons within the DNL 65+ dBA Contour Area, the community of comparison identified in step (c.vii) above.

- e) As previously noted, the 2005 EIS and the 2017 IFQ Re-Eval both applied a cost of living factor for Chicago of 150%¹³. This factor is also applied for this analysis to remain consistent with the prior approaches. Poverty guidelines are also rounded up to the nearest interval at which the Census Bureau reports household income (e.g., \$29,999 or \$34,999) for estimating number of households below the poverty level.

3.0 Environmental Justice Community Identification

This section presents demographic information for specific geographical units, applying the processes described in steps (b.i) and (b.ii), above, focusing on those attributes that enable the comparative analysis required for EJ.

3.1 TAP Reference Community.

The TAP Reference Community consists of the aggregated population of those Census Blocks and Block Groups that lie within the Counties of Cook and DuPage in northeast Illinois. Demographic information for the US and State are also presented for context.

The Primary Study Area for noise lies partially within Cook and DuPage Counties. **Figure 2** presents the geographical extent of the Study Area with Census Blocks and Block Groups depicted. **Table 3** presents the demographic data of the population residing within the Reference Community with respect to race and ethnicity. **Table 4** presents demographic data of the same population with respect to income and poverty. As noted previously, the data in **Table 3** are from the 2020 Census, for which the smallest geographical unit of measure is the Census Block. For **Table 4**, the data are from the 2015-2019 Five Year ACS for which the smallest unit of measure is the Census Block Group, which is larger than the Census Block. Since these datasets are from different time periods and use differing geographical units of measure, the population counts in **Tables 3** and **4** would not be expected to match and in fact do not. **Figures 3, 4, and 5**, indicate whether a Census Block or Block Group lying within the TAP Study Area is an Area of EJ Concern with respect to race/ethnicity (**Figure 3**), income/poverty level (**Figure 4**) or both (**Figure 5**).

Census data indicate that the relevant thresholds for race and ethnicity would be census geographies where “All Other Races” equaled or exceeded 52.3% or where Hispanic ethnicity exceeded 24.6% (**Table 3**). Since the “All Other Races” threshold of 52.3% exceeds the 50% threshold in the “Predominantly Borne” test, any census block where “All Other Races” exceeds 50% are identified in **Figure 3**.

For Income and Poverty Status, census data indicate that the relevant threshold would be 23.2% of households below the poverty level (**Table 4**). Block groups that equal or exceed the threshold are identified in **Figure 4**.

¹² NEPA impact analysis by its nature involves a comparison of the TAP Build Out Proposed Action with the No Action. For EJ analysis with respect to impacts from aircraft noise, the populations of those portions of the census block groups that fall within the entire area experiencing both 65 DNL and a 1.5 dB(A) increase or decrease would be the “Community of Comparison” for assessing disproportionate impact with respect to noise impacts. Individual parcels, blocks, and block groups’ demographic characteristics would be compared to the aggregated characteristics of the entire area experiencing a potentially significant impact. The Community of Comparison for assessing disproportionate effect can and does differ from the Reference Community developed for identifying areas of outreach.

¹³ Federal Aviation Administration, O'Hare Modernization Final Environmental Impact Statement, July 2005. See § 5.21.1.3 Definitions.



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**Table 3. Selected Demographic Characteristics (Race/Ethnicity) of TAP Reference Community
 (Cook & DuPage Counties, IL) and the Study Area**

Census Geography	Total Population	White	% White	All Other Races	% All Other Races	Hispanic	% Hispanic	Non-Hispanic	% Non-Hispanic
United States	331,449,281	191,697,647	57.8%	139,751,634	42.2%	62,080,044	18.7%	269,369,237	81.3%
Illinois	12,812,508	7,472,751	58.3%	5,339,757	41.7%	2,337,410	18.2%	10,475,098	81.8%
Combined Cook/DuPage County*	6,208,418	2,962,813	47.7%	3,245,605	52.3%	1,527,069	24.6%	4,681,349	75.4%
Cook County	5,275,541	2,345,983	44.5%	2,929,558	55.5%	1,382,778	26.2%	3,892,763	73.8%
DuPage County	932,877	616,830	66.1%	316,047	33.9%	144,291	15.5%	788,586	84.5%
Primary Study Area (Noise)	294,333	195,987	66.6%	98,346	33.4%	77,082	26.2%	217,251	73.8%

*Reference Community (shaded) – Threshold Values are enclosed in box

Source: USBC 2020 Decennial Census

Notes:

- 1) A black border around a cell indicates the threshold percentage of the reference community for All Other Races and Hispanic populations.
- 2) Since the All Other Races population of the Reference Community (Combined Cook/DuPage County) is 52.3%, thus exceeding the 50% "predominantly borne" test, identifying all Census Blocks whose populations are greater than 52.3% All Other Races would also necessarily identify any Census Blocks whose populations are greater than the 50% threshold of the Reference Community. Any Census Block whose Hispanic population exceeded that of the Reference Community (24.6%) was also identified.
- 3) Within the TAP Noise Study Area there are 4,178 Census Blocks, of which 667 have a population of greater than 50% minority, 1,222 have a Hispanic population exceeding the threshold of 24.6% and overall, 1,291 Census Blocks have a population of greater than 50% either minority, 24.6% Hispanic, or some combination of both.



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**Table 4. Selected Demographic Characteristics (Income/Poverty) for the TAP Reference Community
 (Cook & DuPage Counties, IL) and the Study Area**

Census Geography	Total Population	Total Pop in Occupied Units	# of Households	Average House-hold Size	Median Households Income	2020 HHS Poverty Guideline	Proposed TAP Poverty Guideline (150%)	# Households Below Poverty	% Households Below Poverty
United States	324,697,795	316,606,796	120,756,048	2.6	\$62,843	\$19,928	\$29,892	28,424,373	23.5%
Illinois	12,770,631	12,473,394	4,846,134	2.6	\$65,886	\$19,928	\$29,892	1,100,389	22.7%
Combined Cook/DuPage County*	6,127,335	6,022,467	2,314,899	2.7	\$68,828	\$20,376	\$30,564	538,114	23.2%
Cook County	5,198,275	5,106,417	1,972,108	2.6	\$64,660	\$19,928	\$29,892	480,130	24.3%
DuPage County	929,060	916,050	342,791	2.7	\$92,809	\$20,376	\$30,564	57,984	16.9%
Primary Study Area (Noise)	240,726	238,506	90,719	2.6	\$78,992	\$19,928	\$29,892	16,589	18.3%

*Reference Community (shaded) – Threshold Values are enclosed in box

Source: HMMH 2021, HHS 2020, USCB 2019 ACS

Notes:

- 1) Within the TAP Study Area there are 207 Census Block Groups, of which 56 have a low- income population that exceeds the threshold of the Reference Community (23.2%).
- 2) For “# Below Poverty” and “% Below Poverty” columns, values for the United States and Illinois rows are taken directly from the Census data. For the remaining rows, poverty guidelines for a Census Block Group are adjusted from the HHS Guidelines by multiplying them by 1.5, consistent with the 2005 EIS and the 2017 IFQ Re-Eval, to reflect the cost of living in Chicago.
- 3) Poverty guidelines are rounded up to the nearest interval (income band) in the Census data (e.g., \$29,999 or \$34,999) at which household income is reported to estimate number of households below the poverty level.



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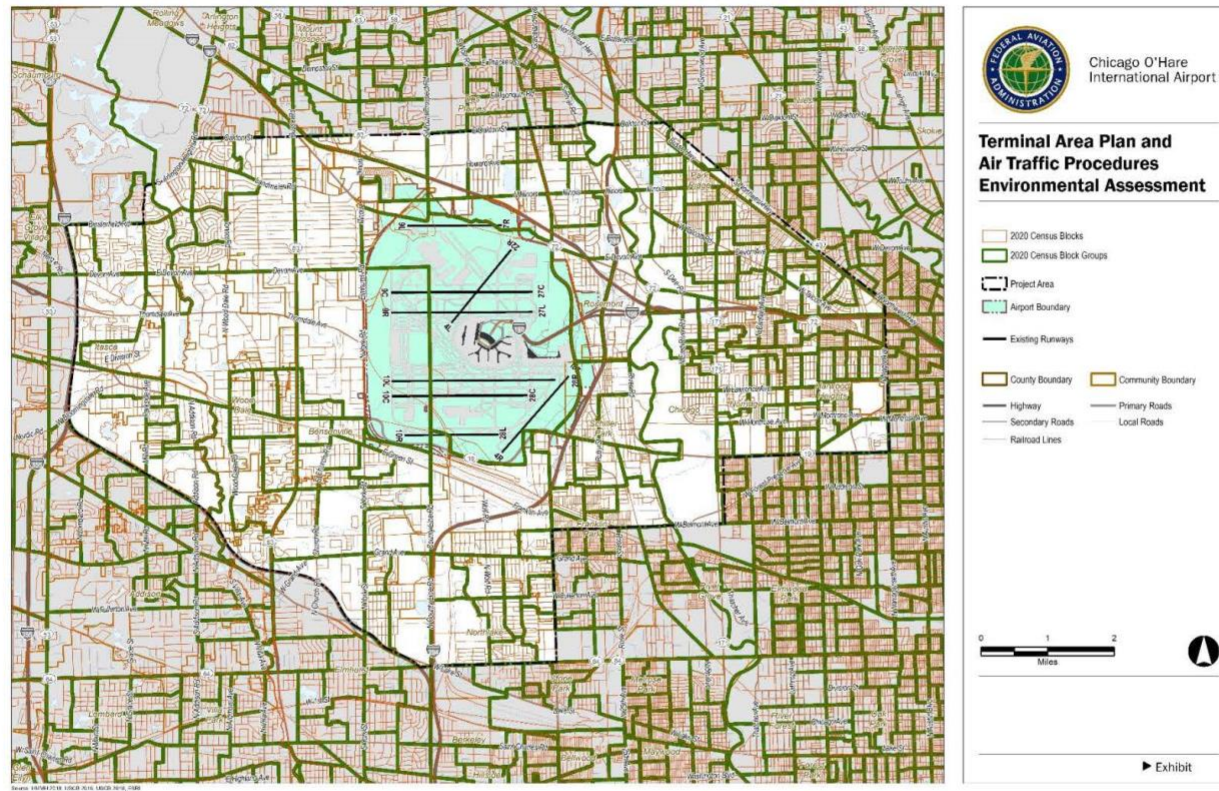


Figure 2. Census Blocks and Census Block Groups
Source: HMMH 2021, USCB 2020



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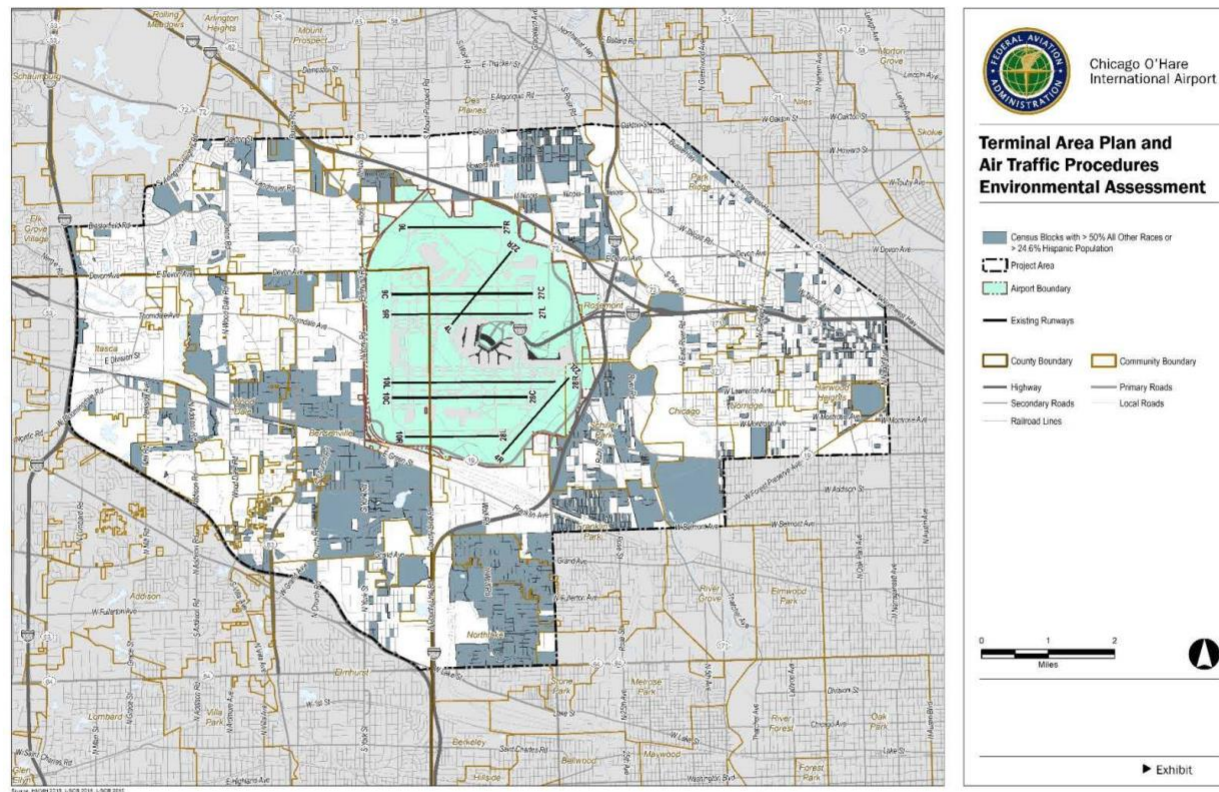


Figure 3. Areas of Environmental Concern with Respect to Race/Ethnicity within the TAP Study Area

Source: HMMH 2021, USCB 2020



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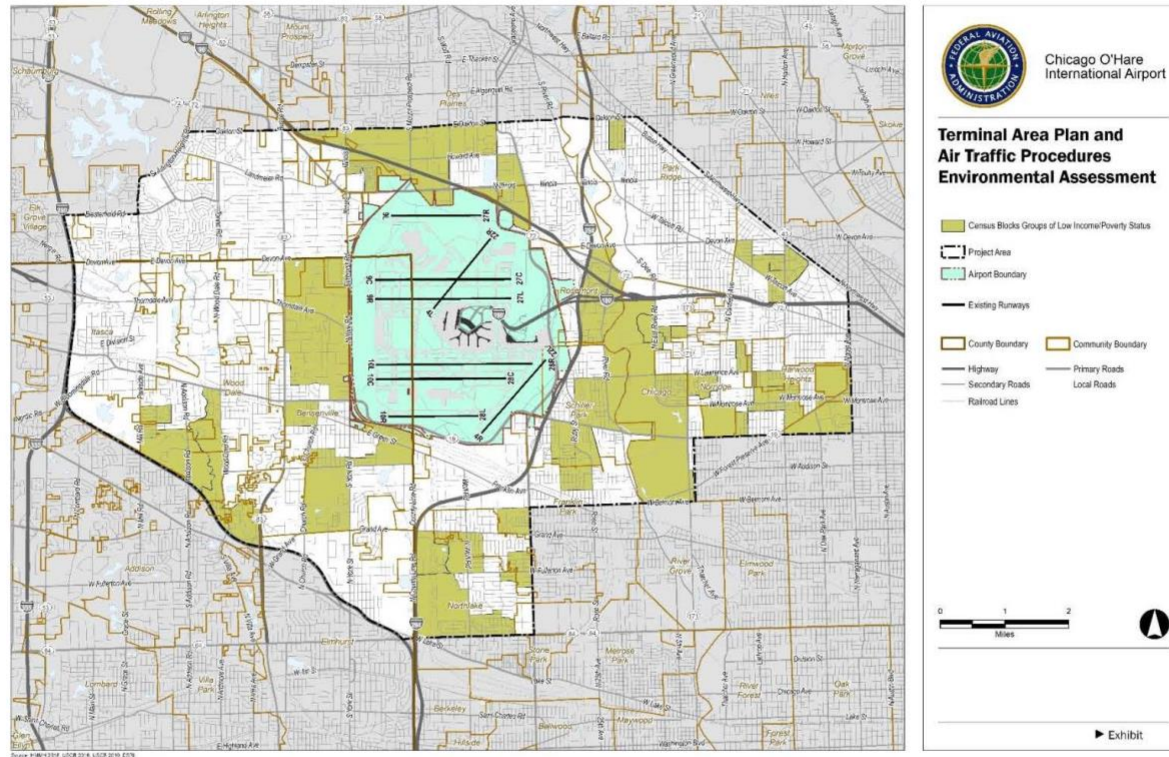


Figure 4. Areas of Environmental Concern with Respect to Income / Poverty Status within the TAP Study Area

Source: HMMH 2021, HHS 2020, USCB 2020, USCB 2019



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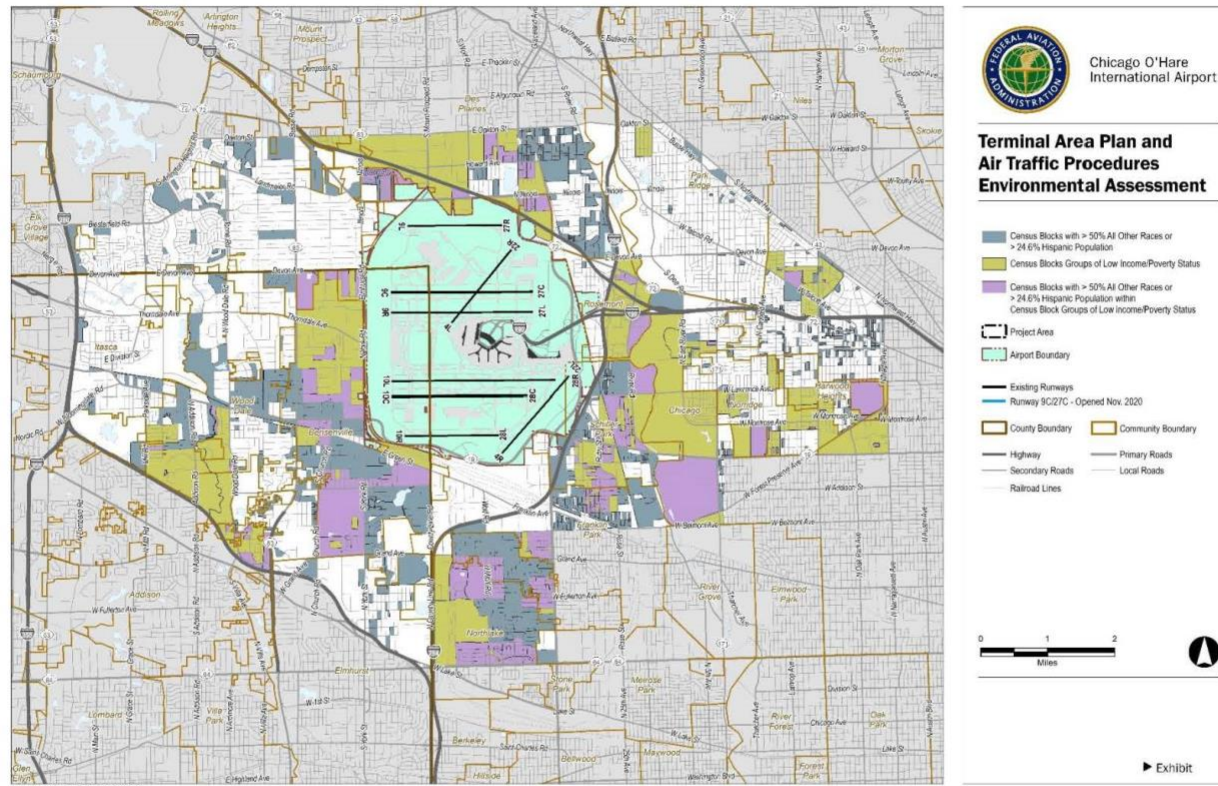


Figure 5. Areas of Environmental Concern with Respect to Both Race/Ethnicity or Income/Poverty Status within the TAP Study Area

Source: HMMH 2021, HHS 2020, USCB 2020, USCB 2019



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3.2 Identification of the Community of Comparison For TAP Noise Impacts

Once specific EJ Areas of Concern were identified by comparison to the reference community, the next step was to compare potential impacts experienced by persons both within and not within specific EJ Areas of Concern with all persons potentially experiencing significant noise impacts, the Community of Comparison. The demographic characteristics of the specific census blocks and block groups involved are detailed in this section. The Community of Comparison itself, which is a subset or portion of these Census geographical units, as well as a detailed EJ analysis of impacts are presented in Section 4.

Nine census blocks within two block groups would experience a significant impact from noise. These are listed in **Table 5** and **Table 6**. The entire population of these blocks/block groups is **not** the Community of Comparison but provides the basic demographic information and assumptions for that detailed analysis.

In **Table 5**, total counts for population, households and racial demographics were taken directly for the 2020 Census. The average household size and racial and ethnic percentages were calculated based on these totals for the analysis in **Table 7**. For example, Census Block 170438408023013 has a total of 386 people, 196 of whom are white, meaning the block is 50.8% white and 49.2% of all other races. In the same way, the block has 81 Hispanic people from the same total meaning 20.9% of the block is Hispanic and 79.1% are non-Hispanic. These racial and ethnic percentages are used in **Table 7** to estimate the demographic makeup of the population potentially experiencing a significant impact. The overall makeup of the census blocks with significant noise impacts, comprised of 886 people in 429 dwellings, is 51.4% white, 48.6% all other races and is 34.5% Hispanic. Most of the affect blocks were not initially identified as EJ Areas of Concern when compared to the TAP Reference Community (**Figure 6**).

For the Income and Poverty data in **Table 6**, the total population and number of households came directly from the 2019 ACS. For each block group the average household size was calculated from the population count and number of households. The total number of households below the poverty level is initially calculated by counting the total households in income intervals below the established TAP poverty level (150% of HHS guidelines). To this result, an additional set of households are added from the income interval containing the poverty threshold. For that income interval a weighted average was applied based on how much the poverty level exceeds the lower bound of the income interval.

For example, if a block group had a calculated poverty threshold of \$27,876 (based that block group's average household size), this threshold would fall within the \$25,000-\$30,000 census income interval. The threshold is 58% of the \$5,000 interval range¹⁴. Therefore 58% of households in that reported income range for this block group would be added to the total number of households whose income is below the poverty threshold (i.e., the total number of households in income intervals below \$25,000).

Block group 170438408023 is calculated to have 15 households below the proposed poverty level out of 388 households in the block group, indicating that 3.8% of the households have an income below the poverty level calculated for this block group. Block group 170438408025 has 76 households below the poverty level out of 462 total in the group, indicating that 16.5% of the households in this second block group have an income below its calculated poverty level. Neither block group exceeds the Reference Community threshold of 23.2% to be identified as an EJ Areas of Concern (**Figure 7**). These poverty rates are used in the Community of Comparison

¹⁴ In this example, USCB Block Group 170438408023 has a calculated poverty threshold of \$27,876 (based an average household size of 2.3 persons per dwelling unit). The lower bound of the \$25,000-\$30,000 census income interval (\$25,000) is subtracted from that block group's calculated poverty threshold (\$27,876), resulting in a difference of \$2,876. This difference is then divided by the income interval width (\$5,000). The resulting percentage (58%) is then applied as a weighting within this income interval to allocate a portion of all households in this block group and income interval in order to estimate poverty status within this interval only. For intervals below \$25,000 in this block group the census-reported number of households in those intervals are included without any weighting. The purpose of the weighting is to allocate households within the income interval where the poverty threshold occurs.



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Analysis in **Table 8**. Overall, the two impacted block groups contain 850 households for 2397 with an average poverty rate of 10.1%.



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**Table 5. Demographic Characteristics (Race/Ethnicity) of Census Blocks
 Experiencing a Potentially Significant Impact from Build Out Proposed Action**

Census Block	Total Population	Number of Households	Average Household Size	White	% White	All Other Races	% All Other Races	Hispanic	% Hispanic	Non-Hispanic	% Non-Hispanic
170438408023007	15	4	3.8	4	26.7%	11	73.3%	6	40.0%	9	60.0%
170438408023008	9	1	9.0	3	33.3%	6	66.7%	1	11.1%	8	88.9%
170438408023009	149	87	1.7	67	45.0%	82	55.0%	59	39.6%	90	60.4%
170438408023010	0	0	0	0	0.0%	0	0.0%	0	0.0%	0	0.0%
170438408023011	0	0	0	0	0.0%	0	0.0%	0	0.0%	0	0.0%
170438408023012	0	0	0	0	0.0%	0	0.0%	0	0.0%	0	0.0%
170438408023013	421	222	1.9	214	50.8%	207	49.2%	88	20.9%	333	79.1%
170438408023014	74	49	1.5	62	83.8%	12	16.2%	13	17.6%	61	82.4%
170438408025002	218	66	3.3	105	48.2%	113	51.8%	139	63.8%	79	36.2%
Summary	886	429	2.1	455	51.4%	431	48.6%	306	34.5%	580	65.4%

Source: HMMH 2021, USCB 2020. Note: The data for Total Population, Number of Households, Populations of White and Hispanic persons were taken directly from census data. The other data were calculated from those values.

**Table 6. Selected Demographic Characteristics (Income/Poverty) for Areas of Census Block Groups
 Experiencing a Potentially Significant Impact from Build Out Proposed Action**

Census Block Group	Total Population	Number of Households	Average Household Size	2020 HHS Poverty Guideline	Proposed TAP Poverty Guideline (150%)	# Households Below Poverty Level	% Households Below Proposed TAP Poverty Level
170438408023	900	388	2.3	\$18,584	\$27,876	15	3.8%
170438408025	1497	462	3.2	\$22,616	\$33,924	76	16.5%
Summary	2397	850	2.8	\$20,824	\$31,236	91	10.1%

Source: HMMH 2021, HHS 2020, USCB 2019

Note: The data for Total Population and Number of Households were taken directly from the census data. The average household size was calculated from these. The count and percentage of households below the poverty level was calculated from the method described in Section 3.2 (adjustment by 150% and reconciling USCB household income intervals to HHS poverty guidelines intervals).



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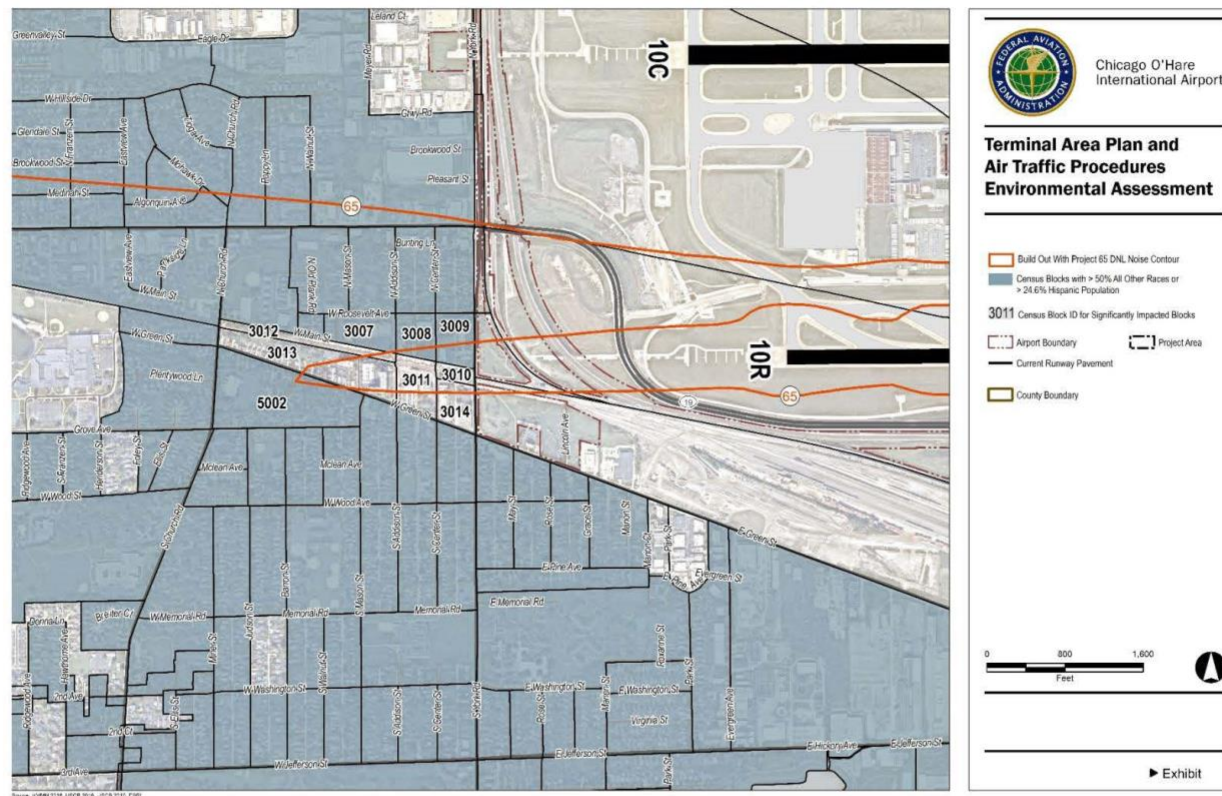


Figure 6. Census Blocks with Areas of Environmental Concern with Respect to Race/Ethnicity Intersecting Potentially Experiencing a Significant Noise Impact from Build Out Proposed Action

Source: HMMH 2021, USCB 2020



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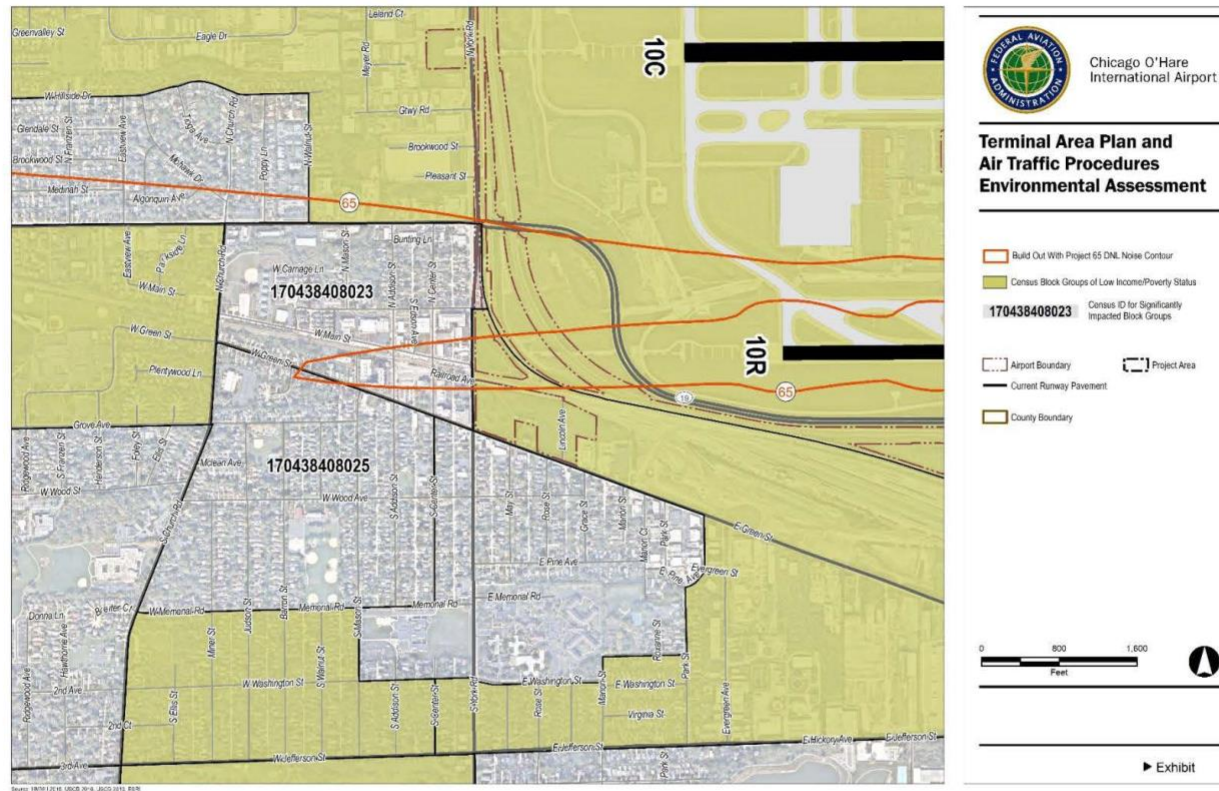


Figure 7. Census Block Groups with Areas of Environmental Concern with Respect to Income and Poverty Intersecting Potentially Experiencing a Significant Noise Impact from Build Out Proposed Action

Source: HMMH 2021, HHS 2020, USCB 2020, USCB 2019



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4.0 Estimate of EJ Populations Experiencing a Significant Impact.

The Community of Comparison is the subset of the Impacted Blocks/Block Groups containing only those specific households affected as shown in **Tables 7 and 8**. This was calculated from a geospatial analysis multiplying the count of households experiencing a significant impact by the average household size of each household's block/block group. The total persons of each demographic (**Table 7**) and households below the poverty level (**Table 8**) were obtained by applying their respective ratio to the whole population. This would imply a level of uniformity to the distribution of these populations, but the assumption is made based on the most granular data available.

Race and ethnicity analysis is based on the decennial Census while income and poverty are based on the ACS. These different data have differing population and housing counts, resulting in different average household sizes. Therefore, the total counts of persons affected will differ between the two analyses.

For the Build Out Proposed Action scenario three Census Blocks in two Census Block Groups have a significant noise impact as defined by NEPA. The three blocks are located southwest of the airport near runway 10R as shown in **Figures 8 and 9**. The blocks are labeled with the block ID (the last 4 digits of the Census ID) in **Figures 8 and 9**. Blocks "3009" and "3013" are in the first listed Block Group (170438408023 in **Table 6**) while "5002" is part of the second Block Group (170438408025).

From the results shown in **Table 8** we expect 227 households to experience a significant noise impact from the Build Out Proposed Action. From housing data provided by Chicago Department of Aviation 224 of these dwellings have been sound insulated leaving three residences¹⁵ (~1.3%) that were not previously sound insulated. Sound insulation would decrease the noise impact on the three dwellings to less than significance, which would also mitigate the EJ effects. The total population affected in the 227 households would range from 530 to 433 people depending on which Census data are used¹⁶. Of this affected population, an estimated six persons would reside in dwellings that have not been mitigated¹⁷.

The affected population is estimated to be 217 (50.1%) white persons and 216 (49.9%) of all other races. This population is estimated to have 102 (23.6%) Hispanic persons and 331 non-Hispanic (76.4%). Comparison of the block demographics to this Community of Comparison shows two blocks, "3009" and "5002", have EJ impacts. The blocks are 55.9% and 51.8% all other races respectively and therefore both exceed the Community of Comparison and, with more than 50% all other races, the Predominantly Borne test. Block "3009" is 39.6% Hispanic which exceeds the Community of Comparison and the Meaningfully Greater test (with a threshold of 33.6% Hispanic). Block "5002" is 63.8% Hispanic which exceeds the Community of Comparison, Meaningfully Greater and Predominantly Borne test.

With respect to poverty, overall nine (4.0%) households containing approximately 22 people would be below the proposed TAP poverty level out of a total of 227 households and 530 people. The block group 170438408025 has one household of four below the poverty threshold, a Meaningfully Greater poverty level than the Community of Comparison.

The same noise analysis was also done for the Interim Project Scenario but found that no one within the 65 DNL area would have a 1.5 dB increase from No Action (i.e. no significant noise impacts).

¹⁵ Of these three residences, one has accepted CDA's offer for sound insulation and is in Phase 18 of the CDA's comprehensive Residential Sound Insulation Program (RSIP). The second residence has also accepted CDA's offer and is in Phase 19. The third residence has been provided eight opportunities for inclusion in the RSIP.

¹⁶ To avoid confusion of the data, analysis of race and ethnicity is based on only the 2020 Decennial Census and poverty analysis on the 2019 ACS.

¹⁷ The three residences that are not mitigated all lie within Census Block 170438408023013. Based on the average household size (1.9 persons per dwelling unit) for this Census Block, it is estimated that 6 persons would reside in those three dwellings.

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Table 7. Estimated Population Counts (Race/Ethnicity) for Areas of EJ Concern for Race/Ethnicity Experiencing a Potentially Significant Impact from Build Out Proposed Action

Census Block (Portion)	Total Affected Population	Number of House-holds	Average House-hold size	White	% White	All Other Races	% All Other Races	Hispanic	% Hispanic	Non-Hispanic	% Non-Hispanic
Community of Comparison	433	227	1.9	217	50.1%	216	49.9%	102	23.6%	331	76.4%
170438408023009	34	20	1.7	15	44.1%	19	55.9%	13	39.6%	21	60.4%
170438408023013	386	203	1.9	196	50.8%	190	49.2%	81	20.9%	305	79.1%
170438408025002	13	4	3.3	6	48.2%	7	51.8%	8	63.8%	5	36.2%

Source: HMMH 2021, CDA 2021, USCB 2020

Note: Census Blocks 170438408023007, 170438408023008, 170438408023010, 170438408023011, 170438408023012, and 170438408023014 (seven Census Blocks) are not presented because although they would experience a 1.5 dB increase from Build Out Proposed Action and, lie within the 65 DNL count, there would not be impacted dwellings within this portion of the contour.

Census Blocks with bolded values indicates Areas of EJ Concern – i.e., % All Other Races or % Hispanic population is greater than Reference Community – whose value is also greater than threshold (% All Other Races or % Hispanic) established by Community of Comparison or exceeds 50%. The percentages in the Community of Comparison to which specific Areas of EJ Concern – Race/Ethnicity (Census Blocks) are compared are enclosed within a box. For the Build Out Proposed Action scenario no census blocks met the condition of both experiencing a significant impact and having racial and/or ethnic population percentages that were meaningfully greater than the threshold (<10%) established by the Community of Comparison. If any blocks did meet this condition they would have been presented in this table as **bolded without italics**.

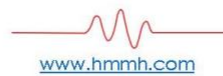
Census Blocks with Bolded/Italics values indicates an Area of EJ Concern whose value is either meaningfully greater (>10%) than the threshold established by the Community of Comparison or greater than 50%. Meaningfully greater for % All Other Races would be greater than 59.9% and for % Hispanic would be greater than 33.6%. For % All Other Races the 50% threshold (Predominantly Borne) is reached prior to the 59.9% threshold (Meaningfully Greater).

Census Blocks with non-bold / non-italic values indicate areas that would experience a significant impact from noise; however, these blocks have not been identified as an Area of EJ Concern.



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Table 8. Estimated Population Counts (Income/Poverty) for Areas of EJ Concern for Low-Income/Poverty Status Experiencing a Potentially Significant Impact from Build Out Proposed Action

Census Block Group (Portion)	Total Affected Population	Number of Households	Average House-hold Size	Median House-hold Income	2020 HHS Poverty Guide-line	Proposed TAP Poverty Guideline (150%)	# House-holds Below Poverty Level	% Households Below Proposed TAP Poverty Level
Community of Comparison	530	227	2.3	\$77,725	\$18,584	\$27,876	9	4.0%
170438408023	517	223	2.3	\$77,426	\$18,584	\$27,876	8	3.8%
170438408025	13	4	3.2	\$91,111	\$22,616	\$33,924	1	16.5%

Source: HMMH 2021, HHS 2020, CDA 2021, USCB 2019

Census Blocks with bolded values indicates an Area of EJ Concern – i.e., % Households Below Proposed TAP Poverty Level – whose value is also greater than threshold (% Households Below Proposed TAP Poverty Level) established by the Community of Comparison or exceeds 50%. The percentage in the Community of Comparison to which specific Areas of EJ Concern – Income/Poverty (Census Block Groups) are compared is enclosed within a box. For the Build Out Proposed Action scenario no census blocks groups met the condition of both experiencing a significant impact and having a percentage of households below the poverty level that were meaningfully greater than the threshold (<10%) established by the Community of Comparison. If any block groups did meet this condition they would have been presented in this table as **bold without italics**.

Census Blocks with Bolded/italics values indicates an Area of EJ Concern whose value is meaningfully greater (>10%) than the threshold established by the Community of Comparison or 50%. Meaningfully greater for % Households Below Proposed TAP Poverty Level would be greater than 14.0%.

Census Blocks with non-bold / non-italic values indicate areas that would experience a significant impact from noise; however, these blocks have not been identified as an Area of EJ Concern.



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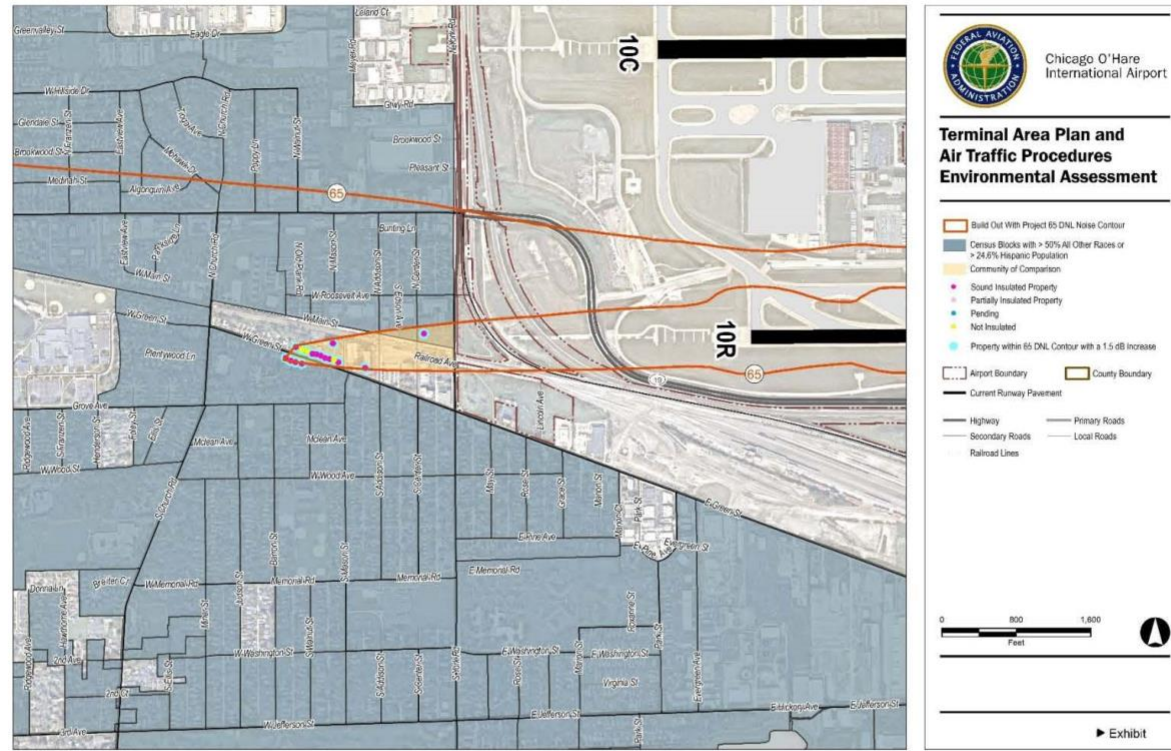


Figure 8. Households Potentially Experiencing a Significant Noise Impacts and Areas of Environmental Concern with Respect to Race/Ethnicity

Source: HMMH 2021, USCB 2020



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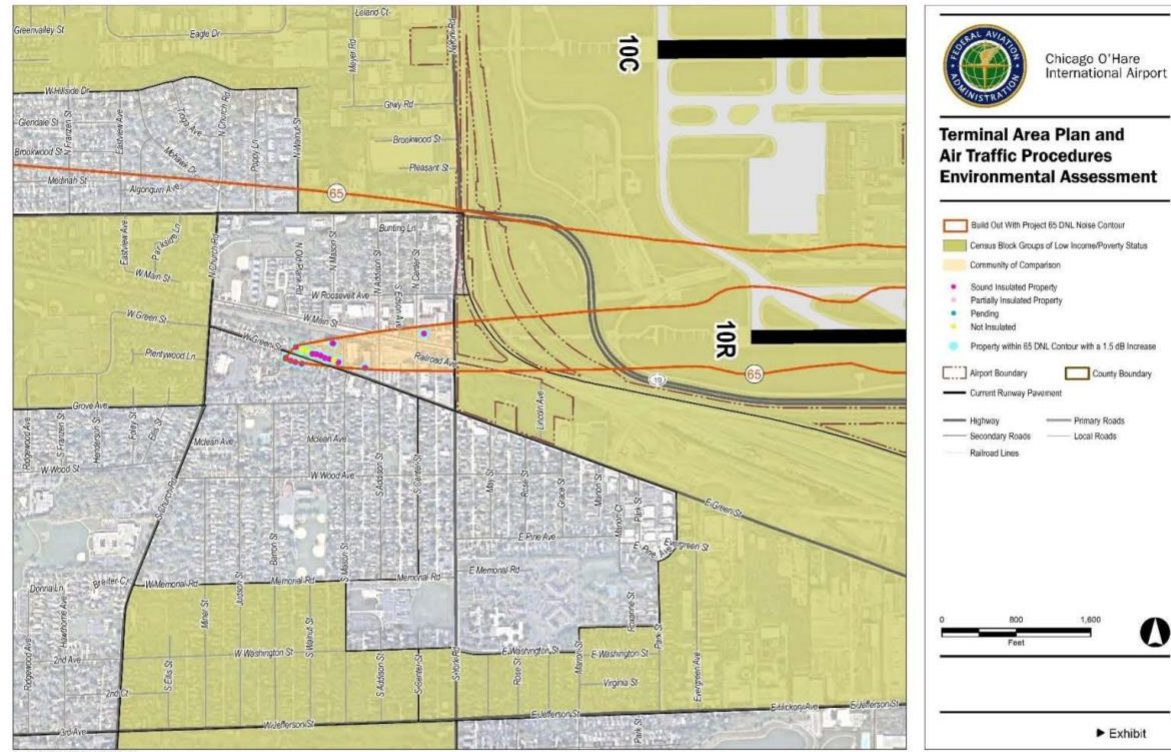


Figure 9. Households Potentially Experiencing a Significant Noise Impacts and Areas of Environmental Concern with Respect to Poverty and Income

Source: HMMH 2021, HHS 2020, USCB 2020, USCB 2019

